

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99

RCRA Corrective Action

Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name:	Wilson Jones
Facility Address:	Crozet, Virginia
Facility EPA ID #:	VAD003124989

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes – check here and continue with #2 below.

 If no – re-evaluate existing data, or

 If data are not available skip to #6 and enter “IN” (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of “Migration of Contaminated Groundwater Under Control” EI

A positive “Migration of Contaminated Groundwater Under Control” EI determination (“YE” status code) indicates that the migration of “contaminated” groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original “area of contaminated groundwater” (for all groundwater “contamination” subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The “Migration of Contaminated Groundwater Under Control” EI pertains **ONLY** to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database **ONLY** as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Is groundwater known or reasonably suspected to be “contaminated”¹ above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

☒ If yes – continue after identifying key contaminants, citing appropriate “levels”, and referencing supporting documentation.

☐ If no – skip to #8 and enter “YE” status code, after citing appropriate “levels”, and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

☐ If unknown – skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Acme Visible Records began manufacturing records storage and retrieval equipment in 1954 in the town of Crozet, located west of Charlottesville, Virginia. Building assets were sold in 1988 and metal-handling operations ceased. The manufacture of printed folders continued until 1992 when the property was purchased a second time by Wilson Jones Corporation. Currently no manufacturing operations exist on site. All equipment associated with former operations was demobilized and/or removed from operation.

Undocumented spills/leaks of chlorinated solvents occurred throughout the history of manufacturing operations and trichloroethene (TCE) concentrations were detected within all three site production wells in 1988 at an average concentration of 700 micrograms per liter (ug/l). Environmental site assessments were performed in 1989 and 1993 that focused efforts at the wastewater lagoon. The lagoon was closed under RCRA regulations with waste “closed in place” and groundwater remediation was initiated in 1999 using Hydrogen Release Compound (HRC) injected into groundwater downgradient of the closed lagoon. Groundwater monitoring was conducted at the closed lagoon pursuant to a post-closure permit and in support of the HRC injection until 2007.

Additional groundwater investigations were performed in 2004 and 2005 to support an Environmental Indicator determination of groundwater contamination under control; however, the additional investigations revealed a greater magnitude of groundwater contamination and led to further investigation and site-wide groundwater monitoring beginning in 2007. Investigation continued through 2007 and the highest concentrations of TCE impacted groundwater were discovered beneath the factory floor. The facility conducts quarterly sampling, semiannual sampling, and annual sampling of various subsets of wells and surface water locations totaling approximately 50 sample points. Table 1 is a listing of all onsite constituents-of-concern that exceed screening levels to date collected for the EI investigations and the Phase I RFI investigation.

Table 1:

Primary Constituents of Concern	MCL/RBC ² (µg/L)	Maximum Detected Concentration (µg/L)	Secondary Constituents of Concern	MCL/RBC ² (µg/L)	Maximum Detected Concentration (µg/L)
1,1,2-trichloroethane	5	14	1,1,1-trichloroethane	200	11.7
1,1-dichloroethane	7	100	1,1-dichloroethene	350	7
1,2-dichloroethane	5	42	2-butanone	7000	6100
Benzene	5	330	Isobutyl alcohol	1800	390
Cis-1,2-dichloroethene	70	1300	3-methylphenol	1800	370
Methylene chloride	5	3100	Methylcyclohexane	630	4.8
Tetrachloroethene	5	5200	Toluene	1000	64
Trichloroethene	5	89000	Trans-1,2-dichloroethene	100	11

Primary Constituents of Concern	MCL/RBC ² (µg/L)	Maximum Detected Concentration (µg/L)	Secondary Constituents of Concern	MCL/RBC ² (µg/L)	Maximum Detected Concentration (µg/L)
Vinyl chloride	2	59	Xylene	10000	98
Acrolein	0.042	37	Beryllium	4	17
Chloroethane	3.64	10	Chromium	100	1100
Chloroform	0.15	43	Iron	1100	59400
Methyl tert butyl ether (MTBE)	2.6	43.9	Lead	15	220
1,4-dioxane	6.1	21.4	Manganese	73	1980
2-methylnaphthalene	24	540	Nickel	73	1200
4-methylphenol	180	370	Zinc	1100	1880
Beta-bhc	0.037	0.62			

Exceedances of groundwater MCLs have occurred throughout the site, but primarily in the vicinity of the vacant factory. Specific locations include directly beneath the metal fabrication area (AOC 6) inside the factory from a temporary well setup within soil boring SB31. The concentrations (Table 1) are typical of the upper saturated zone beneath AOC 6. Other locations include former production well PW-1, and a number of the angled monitoring wells installed for the EI investigations (EI-2, EI-A-2, and EI-A-3). Details of the nature and extent of groundwater contamination can be found in the Phase I RFI Workplan – Revision 1 (November 2006) and the Interim Measures Project Management Plan – Revision 1 (March 2008).

Wilson Jones achieved Current Human Exposures Under Control Environmental Indicator (CA725) on September 23, 2004.

References:

Phase I RCRA Facility Investigation Workplan – Revision 1, November 2006
Interim Measures Project Management Plan – Revision 1, March 2008
EPA Primary National Drinking Water Standards (MCL)
EPA Region 3 RBC Table – April 7, 2007

Footnotes:

¹ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate “levels” (appropriate for the protection of the groundwater resource and its beneficial uses).

² Region III Risk-based Concentrations (RBCs) are used when a Maximum Contaminant Levels (MCLs) are not applicable.

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"² as defined by the monitoring locations designated at the time of this determination)?

_____ If yes – continue after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"²).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"²) – skip to #8 and enter "NO" status code, after providing an explanation.

 X If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Groundwater onsite flows to the southwest through southeast, towards Powell's Branch creek. A number of wells are installed between the facility and the creek and a single shallow well on the opposite side of the creek. The wells, both deep and shallow, prior to the creek are contaminated above screening levels and no history is established for the deeper wells that indicates decreasing or stable constituent concentrations. The well on the opposite side of the creek is shallow, artesian, and confirms that shallow groundwater likely discharges to Powell's Branch creek. No impacts are documented in monitoring wells to the north, northeast, or west of the main manufacturing building. Therefore, the stability of the migration of potentially contaminated groundwater is currently unknown.

The facility has chosen to implement interim measures in the recently (2007) discovered source area beneath the manufacturing floor. Interim measures will consist of a soil vapor extraction system on contaminated soil and a groundwater recirculation system for the saturated zone to enhance in-situ microbe activity. Once the remediation of the source area is begun the plume should begin to stabilize and shrink if it isn't stable already.

Data deficiencies

- two deep off-site wells (MW-46 and MW-47) are to be installed off the southeastern property boundary
- the facility's consultant has suggested that the Phase I RFI report, which provides groundwater analytical results from Westbay MP38-instrumented wells, will detail the status of deeper contaminant migration pathways at the site and that migration has stabilized
- the facility must provide sufficient information to rule out migration of deep groundwater beneath Powell's Branch creek or install deep wells across Powell's Branch creek confirming no GPS exceedances
- the EI determination will be pursued in the ongoing RFI investigation at the facility site and the results submitted in Fall/Winter 2008

Footnotes:

² "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

 X If yes – continue after identifying potentially affected surface water bodies

 If no – skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies

 If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Groundwater onsite flows to the southwest through southeast, towards Powell's Branch creek (See Figure 2 from the Phase I RCRA Facility Investigation Workplan – Revision 1, November 2006). Groundwater from the site is likely the source of Powell's Branch creek as the headwaters are located on the adjacent property to the east. TCE greater than 1,000 ug/l was detected in the upper reaches of Powell's Branch creek along the southwest portion of the site from sample location SW-1B (Figure 2). Concentrations diminished to below the applicable surface water standards prior to exiting the site, 1.2 ug/l from SW-3 (Human Health Surface Water Standard, 810 ug/l). No volatile organic constituents were detected in the stream located southeast of the facility from three samples (SW-East-1, SW-East-2, and SW-East-3).

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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes – skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

X If no – (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

No data has been submitted documenting VOC concentrations in Powell's Branch creek since the Phase II EI site investigation in August 2005. The Department has been shown the results of the creek sampling for the Phase I RFI and the creek contains contamination similar to concentrations reported in the past (TCE \approx 1,000 ug/l), or \sim 200 times greater than the applicable groundwater standard of 5 ug/l (MCL) (see sample location SW-1B of Figure 2, attached).

Concentrations of TCE diminished to below applicable surface water standards prior to exiting the site. TCE was reported at 1.2 ug/l from sample location SW-3. No volatile organic constituents were detected in the stream at three samples locations downgradient and southeast of the facility (SW-East-1, SW-East-2, and SW-East-3).

Footnotes:

³ - As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

 X If yes – continue after either:

- (1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
- (2) providing or referencing an interim-assessment⁵, appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination..

_____ If no – (the discharge of “contaminated” groundwater into surface water is potentially significant) continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown – skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Samples collected from Powell’s Branch creek regularly demonstrate the dilution of TCE to non detectable concentrations prior to the creek exiting the site. The RBC for fish equals 7.9 ug/l. (See discussion Item No. 5)

Footnotes:

⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

- X If yes – continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."
- If no – enter "NO" status code in #8. skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies
- If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The RCRA Facility Investigation is currently ongoing and regular groundwater monitoring is performed pursuant to the approved Phase I RFI workplan. Results are reported on an annual basis. Additional groundwater investigations will be performed under the ongoing RFI to further evaluate groundwater and to further evaluate and complete the groundwater EI determination at the facility site.

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

____ YE – Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the **Wilson Jones Inc.** facility, **EPA ID # VAD003124989**, located in **Crozet, Virginia**. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO – Unacceptable migration of contaminated groundwater is observed or expected.

 X IN – More information is needed to make a determination.

Completed by		<i>Erich Weissbart</i>	Date	9/9/08
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